# FURUNO

# OPERATOR'S MANUAL

## RADAR REMOTE DISPLAY

MODEL  FMD-1712

FURUNO ELECTRIC CO., LTD.

NISHINOMIYA, JAPAN

• Your Local Agent/Dealer

FIRST  EDITION  :  AUG.  2000
            C      :  FEB.  5,2001

*00080902700*

# ⚠ SAFETY INSTRUCTIONS

## *Safety Information for the Operator*

### ⚠ WARNING

**ELECTRICAL SHOCK HAZARD**
**Do not open the equipment.**

Only qualified personnel should work inside the equipment.

**Do not disassemble or modify the equipment.**

Fire, electrical shock or serious injury can result.

**Turn off the power immediately if water leaks into the equipment or the equipment is emitting smoke or fire.**

Continued use of the equipment can cause fire or electrical shock.

**Use the proper fuse.**

Fuse rating is shown on the equipment.
Use of a wrong fuse can result in equipment damage.

**Keep heater away from equipment.**

Heat can alter equipment shape and melt the power cord, which can cause fire or electrical shock.

### ⚠ CAUTION

**A warning label is attached to the display unit. Do not remove the label. If the label is missing or damaged, contact a FURUNO agent or dealer.**

⚠ WARNING ⚠
To avoid electrical shock, do not remove cover. No user-serviceable parts inside.
⚠                    ⚠
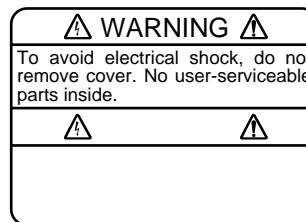
Name: Warning Label (1)
Type: 86-003-1011-0
Code No.: 100-236-230

# *Safety Information for the Installer*

## ⚠ WARNING

**Do not open the equipment unless totally familiar with electrical circuits and service manual.**

**ELECTRICAL SHOCK HAZARD**

Only qualified personnel should work inside the equipment.

---

**Turn off the power at the mains switchboard before beginning the installation.**

Fire, electrical shock or serious injury can result if the power is left on or is applied while the equipment is being installed.

---

**Be sure that the power supply is compatible with the voltage rating of the equipment.**

Connection of an incorrect power supply can cause fire or equipment damage. The voltage rating of the equipment appears on the label above the power connector.

---

**Use only the specified power cable.**

Fire or equipment damage can result if a different cable is used.

## ⚠ CAUTION

**Ground the equipment to prevent mutual interference.**

---

**Observe the following compass safe distances to prevent interference to a magnetic compass:**

| Standard compass | Steering compass |
|---|---|
| 0.9 m | 0.6 m |

# TABLE OF CONTENTS

# FOREWORD

## A Word to FURUNO FMD-1712 Owners

FURUNO Electric Company thanks you for purchasing the FMD-1712 Radar Remote Display. We are confident you will discover why the FURUNO name has become synonymous with quality and reliability.

For over 50 years FURUNO Electric Company has enjoyed an enviable reputation for quality and reliability throughout the world. This dedication to excellence is furthered by our extensive global network of agents and dealers.

Your remote display is designed and constructed to meet the rigorous demands of the marine environment. However, no machine can perform its intended function unless properly installed and maintained. Please carefully read and follow the operation, maintenance and installation procedures set forth in this manual.

We would appreciate feedback from you, the end-user, about whether we are achieving our purposes.

Thank you for considering and purchasing FURUNO.

## Features

The FMD-1712 is a remote display designed for use with the radar Model 1712, Model 1622. Your remote display has a large variety of functions, all contained in a rugged plastic case. All controls respond immediately to the operator's command and each time a key is pressed the corresponding change can be seen on the screen. The RANGE, GAIN and STC controls are commonly set. All other controls may be operated independently.

The main features of the FMD-1712 are

- High definition 7-inch LCD shows echoes in four shades of gray.
- Automatic control of sensitivity and sea clutter suppression for simplified operation.
- Targets can be displayed in gray on white background or vice versa, for optimal viewing under any lighting.
- On-screen alphanumeric readout of all operational information.
- Standard features include Display Shift, EBL, Echo Stretch, Target Trail, Guard Alarm, Interference Rejector, VRM, Zoom.
- Guard zone watches for targets entering (or exiting) a guard zone.
- Operates on 12 V or 24 V power and maximum power consumption is 8 watts.
- Position in latitude and longitude, speed, and range and bearing to a waypoint can be shown in the bottom text area. (Requires navigation data input in NMEA 0183 format.)
- LCD equipped with temperature sensor which maintains excellent LCD viewability under temperature change.

# SYSTEM CONFIGURATION

RADAR
**MODEL 1712**
**or**
**MODEL 1622**

External Buzzer
OP03-168

Navigator (GPS, etc.)/
Video Sounder

**DISPLAY UNIT**
**RDP-137**

OR

Video Sounder

NMEA 0183

Navigator (GPS, etc.)

- - - - - Option

- · - · - Local Supply

Rectifier
PR-62

12-24 VDC

Ship's Mains
100/110/
220/230 VAC
$1\phi$, 50/60 Hz
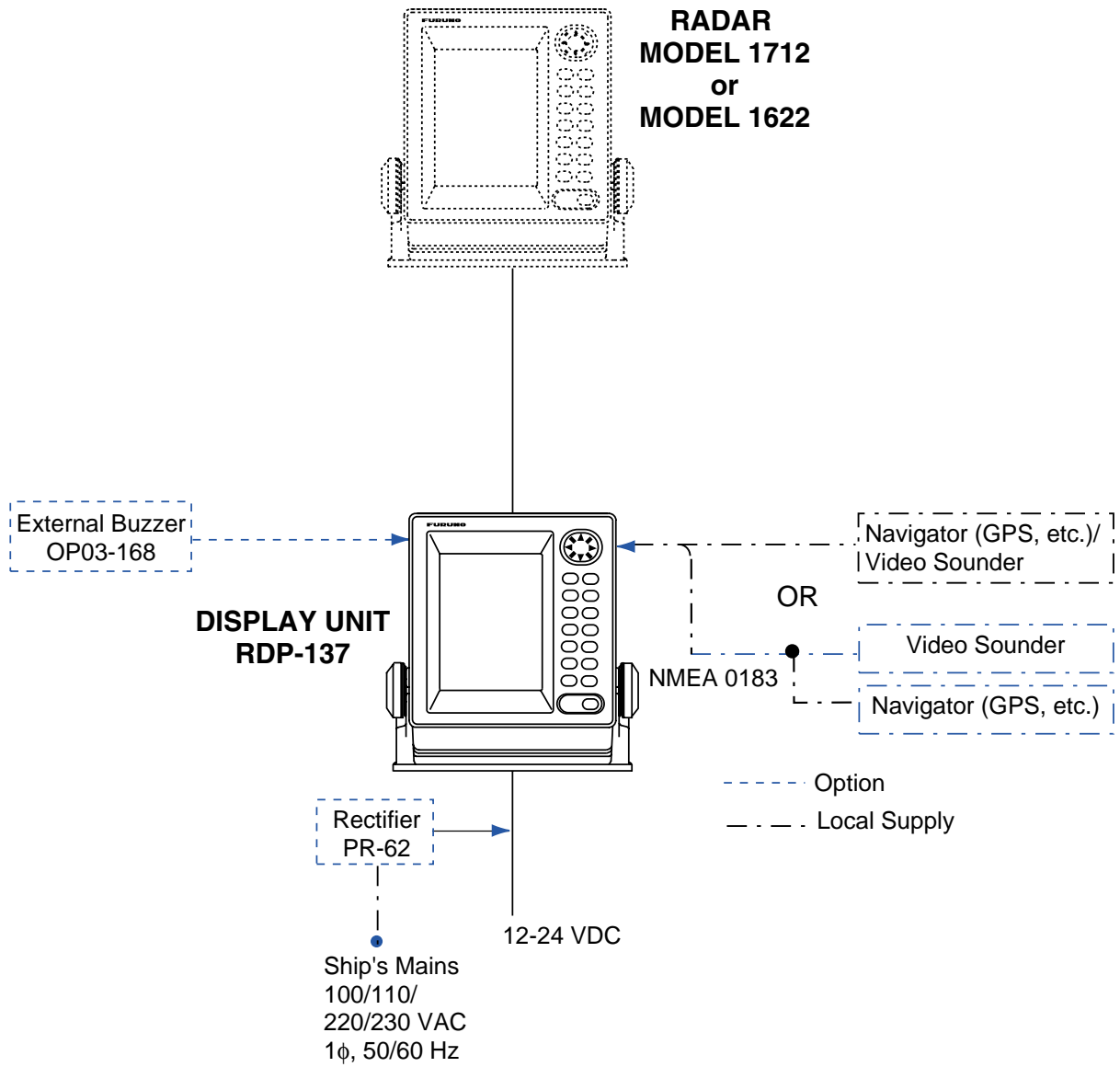
# EQUIPMENT LIST

## Standard Supply

| Name | Type | Code No. | Qty | Remarks | |
|------|------|----------|-----|---------|--|
| Display Unit | RDP-137 | – | 1 | w/hanger, cover | |
| Spare Parts | SP03-09800 | 000-085-441 | 1 set | Fuse (Type: FGBO-A 5A 125 VAC, Code No.: 000-549-064) | |
| Installation Materials | CP03-21100 | 000-087-761 | 1 set | No signal cable | w/power cable and installation materials CP03-21101. See Installation Materials below for details. |
| | CP03-21110 | 000-087-762 | | 5 m signal cable | |
| | CP03-21120 | 000-087-763 | | 10 m signal cable | |
| | CP03-21130 | 000-087-764 | | 20 m signal cable | |
| | CP03-21140 | 000-087-765 | | 30 m signal cable | |

## Installation Materials

| Name | Type | Code No. | Qty | Remarks |
|------|------|----------|-----|---------|
| Signal Cable (5 m) | MJ-A10SPF0008-050 | 000-143-494 | 1 | Select one, connector at both ends |
| Signal Cable (10 m) | MJ-A10SPF0008-100 | 000-143-495 | | |
| Signal Cable (20 m) | MJ-A10SPF0008-200 | 000-143-496 | | |
| Signal Cable (30 m) | MJ-A10SPF0008-300 | 000-143-497 | | |
| Power Cable Assy. | 03S9148 | 000-129-613 | 1 | Connector, fuse, 3.5 m |

## Installation Materials CP03-21101 (Code No. 008-507-090)

| Name | Type | Code No. | Qty | Remarks |
|------|------|----------|-----|---------|
| Dummy Film | 03-118-1103-0 | 100-185-380 | 1 set | |
| Tapping Screw | 5X20 | 000-802-081 | 4 | |
| Screw | 3X12 | 000-805-905 | 4 | |
| MJ-XH Connector | 03-2023(10-10P) | 008-506-980 | 1 | |

## Optional Equipment

| Name | Type | Code No. | Qty | Remarks |
|------|------|----------|-----|---------|
| Cable Assy. | MJ-A6SPF0003-050 | 000-117-603 | 1 | Connector at one end, 5 m |
| | MJ-A6SPF0009-100 | 000-125-236 | 1 | Connector at one end, 10 m |
| Rectifier | PR-62 | 000-013-484 | Select one | 110 VAC ship's mains |
| | PR-62 | 000-013-485 | | 110 VAC ship's mains |
| | PR-62 | 000-013-486 | | 220 VAC ship's mains |
| | PR-62 | 000-013-487 | | 230 VAC ship's mains |
| External Buzzer | OP03-168 | 008-462-790 | 1 | Connector at one end, 1 m, MJ-XH connector |

# 1. OPERATION

## 1.1 Controls
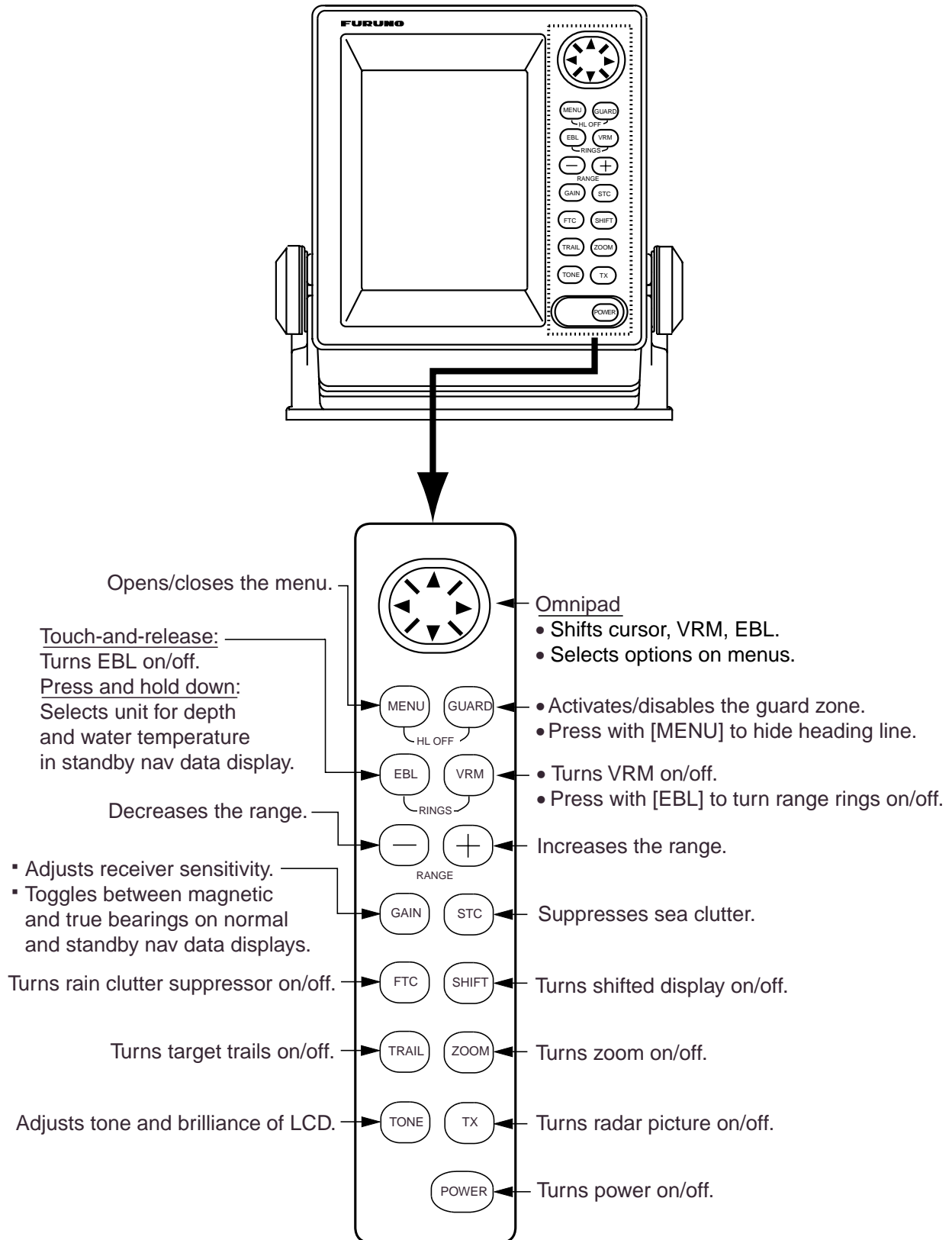


*Figure 1-1 Control panel*

## 1.2 Turning the Remote Display On/Off

The [POWER] key turns the remote display on/off.

## 1.3 TX Key

The [TX] key functions to toggle the radar picture and stand-by condition. Note that the remote display cannot control the transmit and standby functions of the radar.

The main radar and remote display do not operate jointly unless a key among RANGE, GAIN or STC is operated.

## 1.4 LCD Tone and Brilliance

1. Press the [TONE] key. The dialog box shown in Figure 1-1 appears.

```
┌─────────────────────────────┐
│         TONE: 12            │
│                             │
│      LOW  ◄   ►  HIGH       │
│                             │
│  ▣▪▣▪▣▪▣□□□□□□□□□           │
├─────────────────────────────┤
│         BRILL: 3            │
│                             │
│      LOW  ▼   ▲  HIGH       │
│                             │
│  ▣▪▣□□□□□□□                 │
└─────────────────────────────┘
```
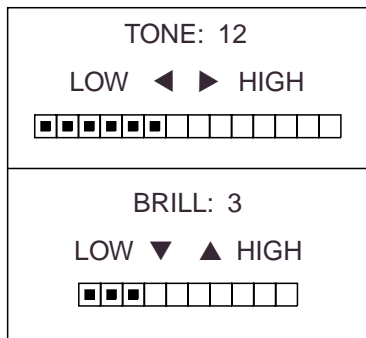
*Figure 1-2 Dialog box for adjustment of brilliance and tone of LCD*

2. Press ◄ or ► to adjust tone (setting range: 0-27): ▲ or ▼ to adjust brilliance (setting range: 0-9).

**Note:** The dialog box for adjustment is automatically erased when there is no Omnipad operation for 10 seconds.

## 1.5 Operation Conventions

The main radar (Model 1712 or 1622) must be powered and transmitting to display the radar picture on the remote display. If the main radar is off, in standby, or there is antenna trouble, the remote display shows the indications HD-SIG-MISS and BP-SIG-MISS.

### RANGE, GAIN and STC controls

- The RANGE, GAIN and STC controls are commonly set. (Other controls may be independently set.) That is, when one of those controls is adjusted, the main radar or remote display receiving the command is automatically set accordingly. STC and GAIN adjustment methods (automatic and manual) are also commonly switched.

- The last-operated control among GAIN, RANGE and STC takes priority when the main radar and remote display are operated simultaneously. Therefore, if your command was not accepted the reason may be simultaneous operation.

- Range is commonly set regardless of range setting on the menu of the main radar and remote display. For example, the remote display selects the 2 nm range. The main radar also sets the 2 nm range even if it is turned off on its menu.

**Watchman**

The watchman feature, disabled or enabled at the main radar, periodically transmits pulses to check for targets in the guard zone. For further details, see the Operator's Manual for the main radar.
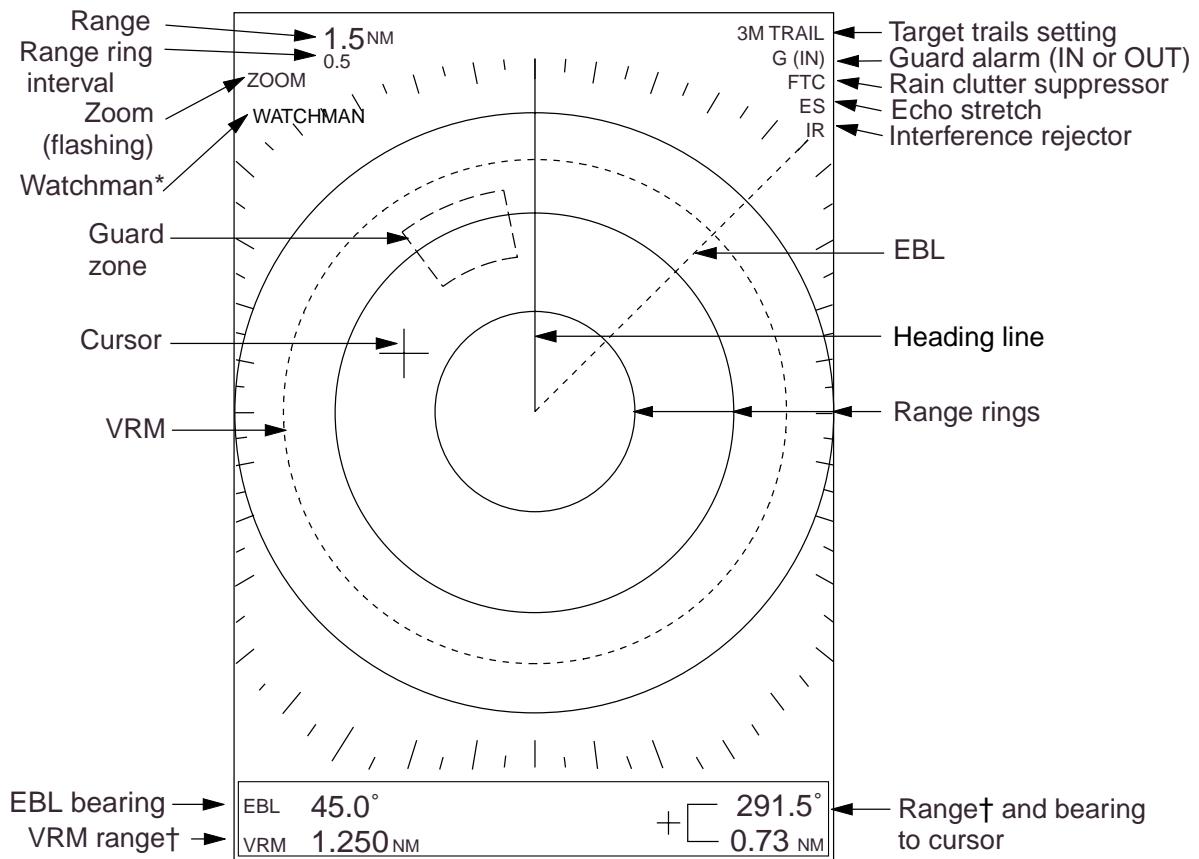
- The indication "WATCHMAN" appears on the remote display and main radar when watchman is active.

- The indication is shown in white on black background for two seconds on the remote display when the [RANGE] key on the remote display is operated while Watchman is in standby. (Range command is not accepted in this case.)

- Operating any key among GAIN, RANGE and STC from the remote display while the watchman is transmitting will automatically cancel the watchman, and the radar transmits continuously. Watchman cannot be canceled from the remote display when it is in standby.

**Guard zone**

The guard zone may be independently set.

## 1.6 Indications and Markers



Range — 1.5 NM
Range ring interval — 0.5
Zoom (flashing) — ZOOM
Watchman* — WATCHMAN
Guard zone
Cursor
VRM

3M TRAIL ← Target trails setting
G (IN) ← Guard alarm (IN or OUT)
FTC ← Rain clutter suppressor
ES ← Echo stretch
IR ← Interference rejector

EBL
Heading line
Range rings

EBL bearing → EBL  45.0°
VRM range† → VRM  1.250 NM
291.5°
0.73 NM ← Range† and bearing to cursor

\* Shown in white on black background for two seconds when [RANGE] key is operated while Watchman is in standby, to inform that [RANGE] key is inoperative.
† Range is shown to thousandths place (X.XXX) when range is 2 nm and under and hundredths place (XX.XX) when range is 3 nm and higher.

*Figure 1-3 Indications and markers*

## 1.7 Selecting the Range

The range selected automatically determines the range ring interval, the number of range rings and pulse repetition rate.

Press the [+] or [-] key to select a range. The range and range ring interval appear at the top left-hand corner on the screen.
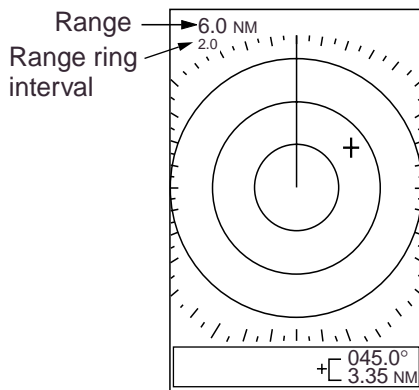


*Figure 1-4 Location of range and range ring interval indications*

## 1.8 Receiver Sensitivity

The [GAIN] key adjusts the sensitivity of the receiver. It works in precisely the same manner as the volume control of a broadcast receiver, amplifying the signals received.

You can adjust the sensitivity manually, or let the unit do it automatically. In either case the proper setting is such that the background noise is just visible on the screen. For manual adjustment, adjust the sensitivity on the highest range since the background noise is clearer on that range.

If you set up for too little sensitivity, weak echoes may be missed. On the other hand excessive sensitivity yields too much background noise; weak targets may be missed because of the poor contrast between desired echoes and the background noise on the display.

### Automatic adjustment of sensitivity

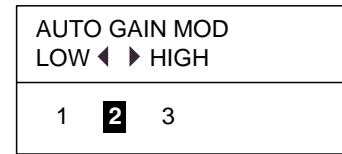1. Press the [GAIN] key once or twice to display the screen shown in Figure 1-5.



*Figure 1-5 Dialog box for automatic adjustment of gain*

2. Press ◀ or ▶ to set level desired: 1, Low; 2, Normal; 3, High.

### Manual adjustment of sensitivity

1. Select the highest range.
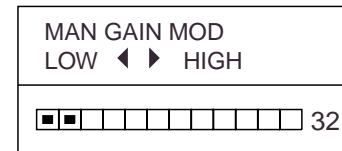2. Press the [GAIN] key once or twice to display the screen shown in Figure 1-6.



*Figure 1-6 Dialog box for manual adjustment of gain*

3. Press ◀ or ▶ to set level desired. 61 levels are available.

**Note:** The dialog boxes for adjustment of sensitivity are automatically erased when there is no Omnipad operation for 10 seconds. To erase them quicker, press the [GAIN] key after completing the setting.

## 1.9 Suppressing Sea Clutter

In rough weather, returns from the sea surface are received over several miles around own ship and mask nearby targets. This situation can be improved by properly using the [STC] key.

If the STC setting is too low, targets will be hidden in the clutter, while if it is set too high, both sea clutter and targets will disappear from the display. In most cases adjust the key until clutter has disappeared to leeward, but a little is still visible windward.

A common mistake is too over-adjust the [STC] key so that the surface clutter is completely removed. By setting up for maximum STC effect, you will see how dangerous this can be; a dark zone will be created near the center of the screen, causing a loss of close-in targets. This dark zone is even more dangerous if the sensitivity has not been properly adjusted. Always leave a little surface clutter visible on the screen. If no clutter is observed (on very calm waters), choose lowest STC setting.
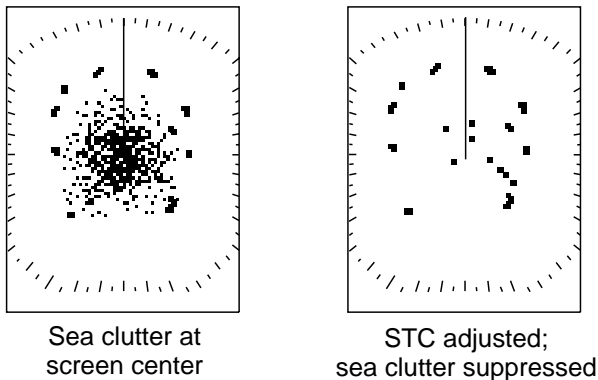


| Sea clutter at screen center | STC adjusted; sea clutter suppressed |

*Figure 1-7 Appearance of sea clutter*

---

## ⚠ **CAUTION**

**STC may erase weak echoes. Set STC to LOW when no sea surface reflections are present.**

---

### Automatic sea clutter control

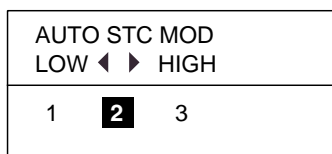1. Press the [STC] key once or twice to show the dialog box shown in Figure 1-8.



*Figure 1-8 Dialog box for automatic adjustment of STC*

2. Press ◀ or ▶ to set level desired: 1, Low; 2, Normal; 3, High.

### Manual adjustment of sea clutter control

1. Press the [STC] key once or twice to display the dialog box shown in Figure 1-9.
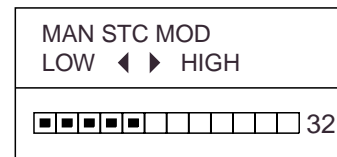


*Figure 1-9 Dialog box for manual adjustment of STC*

2. Press ◀ or ▶ to set level desired. 61 levels are available.

**Note:** The dialog boxes for adjustment of STC are automatically erased when there is no Omnipad operation for 10 seconds. To erase them quicker, press the [STC] key after completing the setting.

## 1.10 Suppressing Rain Clutter

In adverse weather, clouds, rain or snow produce spray-like spurious echoes which impair target detection over a long distance. These echoes can be suppressed by turning on the [FTC] (Fast Time Constant) key. FTC appears at the top right-hand corner on the screen when the FTC is on. Turn off the FTC when its use is not required so as not to miss weak targets.
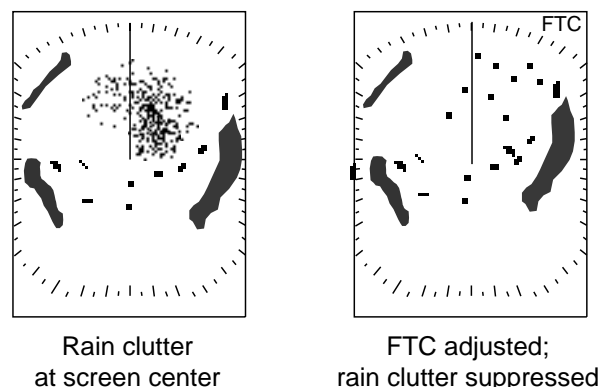


| Rain clutter at screen center | FTC adjusted; rain clutter suppressed |

*Figure 1-10 Appearance of rain clutter*

## 1.11 Range Rings

The range rings are the concentric circles around own ship and they provide an estimate of target range. The selected range scale automatically determines the number of rings and their interval is displayed at the upper-left-hand corner on the screen.

To turn the range rings on or off, press the [EBL] and [VRM] keys together.

## 1.12 Cursor

The cursor is always displayed and functions to measure the range and bearing to a target. Operate the Omnipad to place the cursor on the inside edge of the target for range measurement or the center of the target for bearing measurement. The range and bearing to the cursor appear at the bottom right-hand corner on the display.
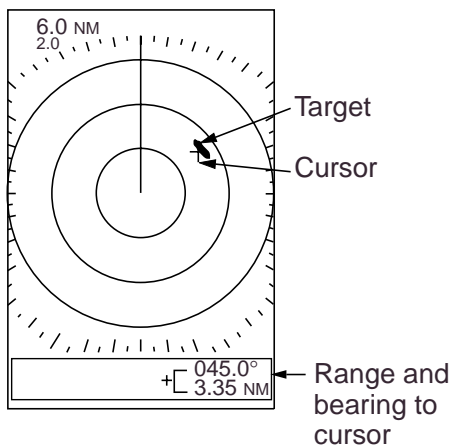


Figure 1-11 How to measure range and bearing with the cursor

## 1.13 Heading Line

The heading line indicates the ship's heading and it is the solid line which appears at zero degrees on the bearing scale.

To temporarily erase the heading line to look at targets existing dead ahead of own ship, press the [MENU] and [GUARD] keys together. Release the keys to display the heading line.

6

## 1.14 Measuring the Range

The bearing to a target can be measured by the range rings, by the cursor (see paragraph 1.12) and by the VRM (Variable Range Marker).

### Measuring range by the range rings

Count the number of rings between the center of the display and the target. Check the range ring interval at the top left-hand corner of the screen and judge the distance of the echo from the inner edge of the nearest ring.

### Measuring range by the VRM

1. Press the [VRM] key to turn on the VRM.
2. Within 10 seconds after turning on the VRM, that is, while "VRM" is highlighted at the bottom left-hand corner on the screen, press ▲ (increase radius) or ▼ (decrease radius) to place the VRM on the inside edge of the target.
3. Check the VRM readout at the bottom left-hand corner on the screen.

**Note:** The VRM becomes stationary when the [VRM] key is pressed a second time, or 10 seconds elapses without pressing ▲ or ▼. When the VRM is stationary "VRM" is not highlighted.
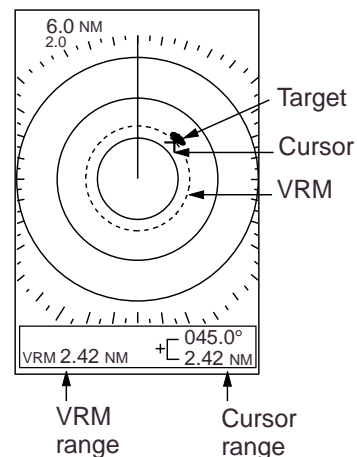


Figure 1-12 How to measure range by the cursor and VRM

**To erase the VRM,** press the [VRM] key until the VRM disappears.

## 1.15 Measuring the Bearing

The bearing to a target can be measured by the cursor (see paragraph 1.12) and by the EBL (Electronic Bearing Line).

### Measuring bearing by the EBL

1. Press the [EBL] key to turn on the EBL.
2. Within 10 seconds after turning on the EBL, that is, while "EBL" is highlighted at the bottom left-hand corner on the screen, press ◀ (counterclockwise) or ▶ (clockwise) to bisect the target with EBL.
3. Check the EBL readout at the bottom left-hand corner on the screen.

**Note:** The EBL becomes stationary when the [EBL] key is pressed a second time, or 10 seconds elapses without pressing ◀ or ▶. When the EBL is stationary "EBL" is not highlighted.
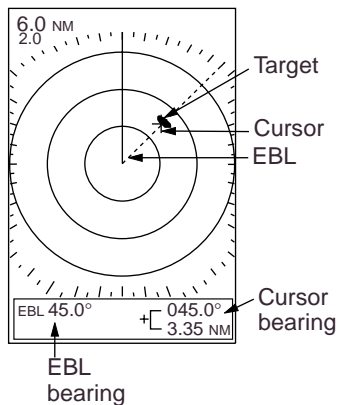


*Figure 1-13 Measuring bearing by the cursor and the EBL*

**To erase the EBL,** press the [EBL] key until the EBL disappears.

## 1.16 Shifting the Display

Your vessel's position can be shifted backward by 1/3 of the range to increase the forward range without changing the range or size of targets.

Press the [SHIFT] key to turn the shifted display on/off.
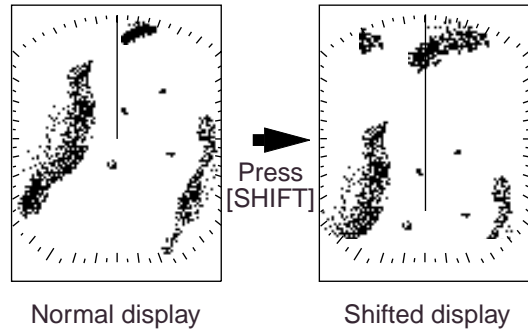


*Figure 1-14 Shifting the display*

## 1.17 Zoom

The zoom feature allows you to double the size of the area between your vessel and any location within the current range to take a closer look at an area of interest.

1. Select location to zoom with the cursor.
2. Press the [ZOOM] key.
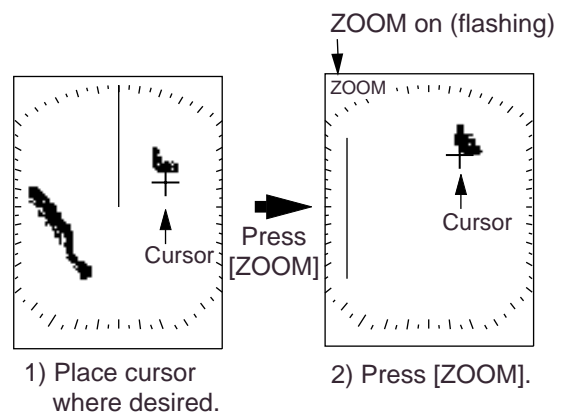


*Figure 1-15 Zoom function*

3. To turn off the zoom function, press the [ZOOM] key again.

**Note 1:** Zoom is inoperative when the display is shifted.

**Note 2:** Zoom is not available on the 0.125 (1/8) nm range.

## 1.18 Menu Overview

The menu contains ten functions which normally do not require frequent adjustment in everyday operation. Basic menu operation is as below.

### Operating procedure

1. Press the [MENU] key to display the menu.

```
PRESS ▲/▼ TO SELECT MENU
ITEM, ◄/► TO CHANGE SETTING.

1   ECHO STRETCH    ON  OFF
2   INT.  REJECT    ON  OFF
3   NAV DATA        ON  OFF
4   VIDEO           RVS    NOM
5   WATCHMAN        SET ON M. DISP
6   DIMMER              0 1 2 3
```

*Press ▼ at DIMMER; ▲ at DSPL ON STBY to change page. Default settings in highlight.*

```
PRESS ▲/▼ TO SELECT MENU
ITEM, ◄/► TO CHANGE SETTING.

7    DSPL ON STBY    NAV  OFF
8    TRAIL TIME      CONT  30S
                     1M 3M  6M
9    TRAIL BRILL     LOW HIGH
10   RANGE (NM)      1/8 1/4 1/2 3/4 1 1.5
                     2 3 4 6 8 12 16 24
```

*Figure 1-16 Menu
(default settings highlighted)*

2. Press ▲ or ▼ to select item.
3. Press ◄ or ► to select option.
4. Press the [MENU] key to register your selection and close the menu.

*Table 1-1 Menu description*

| Menu Item | | Description |
|---|---|---|
| 1 | ECHO STRETCH | Stretches echoes in the range direction. |
| 2 | INT. REJECT | Suppresses radar interference. |
| 3 | NAV DATA | Turns the navigation data display on/off. |
| 4 | VIDEO | Displays echoes in gray (NOM) or white (RVS). |
| 5 | WATCHMAN | Set at radar. |
| 6 | DIMMER | Adjusts control panel illumination. |
| 7 | DSPL ON STBY | Turns navigation data display in standby on/off. |
| 8 | TRAIL TIME | Selects target trail plotting time. |
| 9 | TRAIL BRILL | Selects target trail brilliance. |
| 10 | RANGE | Selects ranges to use. |

## 1.19 Control Panel Illumination

1. Press the [MENU] key to open the menu.
2. Select DIMMER.
3. Select level desired; 3 is the highest level of Illumination.
4. Press the [MENU] key to register your selection and close the menu.

## 1.20 Target Trails

Target trails are simulated afterglow of target echoes that represent their movements relative to own ship. This feature is useful for monitoring targets' movement.
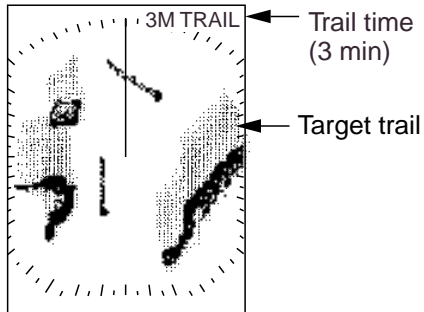


*Figure 1-17 Target trails*

### Starting target trail

Press the [TRAIL] key to start the echo trail function. "TRAIL" and the target trail time appear at the top right-hand corner on the screen, and then afterglow starts extending from all targets. When the internal clock counts up to the trail time selected, the oldest portions of trails are erased so only the latest trail, equal in length to the trail time selected, is shown. For continuous trails the maximum trail time is 99 minutes and 59 seconds, at which point all trails are erased and then restarted.

### Canceling target trail

Press the [TRAIL] key to erase target trails and target trail indications.

### Trail time

1. Press the [MENU] key to open the menu.
2. Select TRAIL TIME (on page 2 of the menu).
3. Select target trail time desired; continuous, 30 seconds, 1, 3 or 6 min as appropriate.
4. Press the [MENU] key to register your selection and close the menu.

### Trail brilliance

1. Press the [MENU] key to open the menu.
2. Select TRAIL BRILL (on page 2 of the menu).
3. Select HIGH or LOW as appropriate.
4. Press the [MENU] key to register your selection and close the menu.

## 1.21 Guard Alarm Zone

The guard alarm allows the operator to set the desired range and bearing for a guard zone. When ships, islands, landmasses, etc. violate the guard zone the offending target flashes and an aural alarm sounds to call the operator's attention. The alarm is triggered against targets entering or exiting the guard zone depending on guard zone type as below.

---

### ⚠ CAUTION

\* The alarm should not be relied upon as the sole means for detecting possible collision situations.

\* STC, FTC and GAIN controls should be properly adjusted to be sure the alarm system does not overlook target echoes.

---

### How guard zone type is determined

After the guard zone is set, the radar starts searching for targets inside the guard zone for about 8 to 12 seconds. The results of the search are shown at the top right-hand corner of the display as "G (IN)" or "G (OUT)."

**G (IN):** This is the inward guard alarm and it means no target was found in the guard zone. The guard alarm will be triggered by targets entering the guard zone.

**G (OUT):** This is the outward guard alarm and it means a target was found in the guard zone. The guard alarm will be triggered by targets exiting the guard zone.
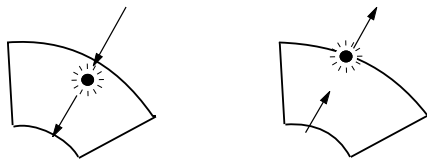
(a) Inward guard alarm  (b) Outward guard alarm

*Figure 1-18 Inward and outward guard alarms*

## Setting a guard zone

1. Operate the Omnipad to place the cursor at the top left-hand corner of the zone and press the [GUARD] key.
2. Operate the Omnipad to place the cursor at the bottom right-hand corner of the zone and press the [GUARD] key. Eight to twelve seconds later the indication G (IN) (or G (OUT)) replaces the indication GUARD.
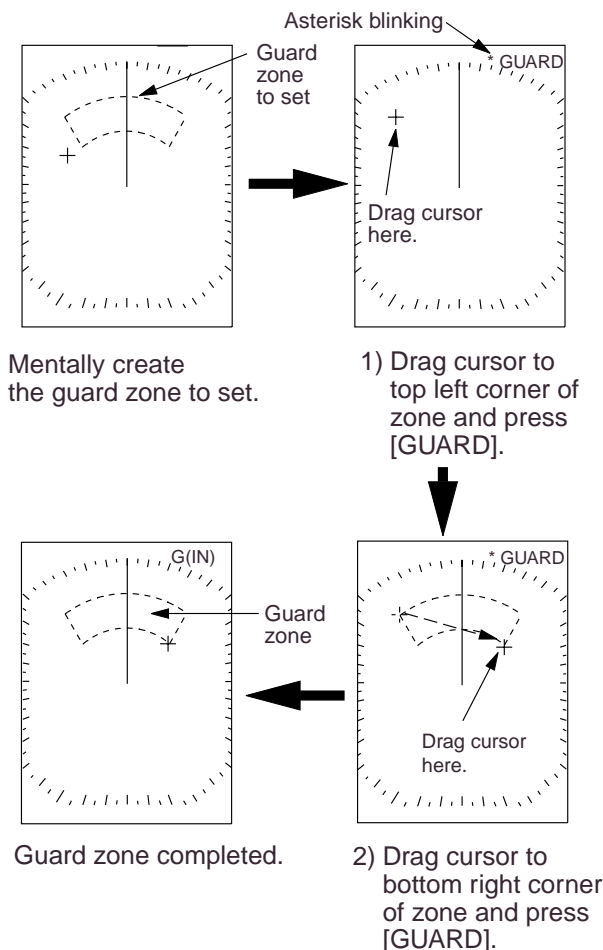


*Figure 1-19 How to set a guard zone*

**Note:** When the range is less than one half of the guard zone range, the guard zone disappears and the indication "UP RNG" replaces G (IN) (or G (OUT)). If this happens, raise the range to redisplay the guard zone.

## Silencing the aural alarm

When a target violates the guard zone, the target flashes and the aural alarm sounds. You can silence the aural alarm by pressing the [GUARD] key. When this is done, GUARD (highlighted) replaces G (IN) (or G (OUT)). This means the guard alarm is temporarily deactivated. Press the key again to reactivate the alarm.

## Canceling the guard zone and guard alarm

Press and hold down the [GUARD] key (about two seconds) to erase the guard zone.

# 1.22 Interference Rejector

Mutual radar interference may occur in the vicinity of another shipborne radar operating in the same frequency band (9 GHz). It is seen on the screen as a number of bright spikes either in irregular patterns or in the form of usually curved spoke-like dotted lines extending from the center to the edge of the picture. This type of interference can be reduced by activating the interference rejector. "IR" appears at the top right-hand corner when the interference rejector is on.

1. Press the [MENU] key to open the menu.
2. Select INT. REJECT.
3. Select ON or OFF as appropriate.
4. Press the [MENU] key to register your selection and close the menu.



*Figure 1-20 Radar interference*

## 1.23 Echo Stretch

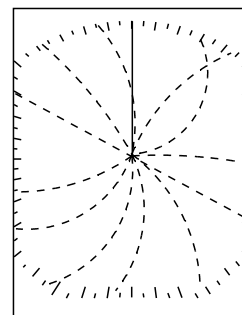On long ranges target echoes tend to shrink in the range direction, making them difficult to see. On short and medium ranges such as 1.5, 3 and 6 nm range scales, the same sized targets get smaller on screen as they approach own ship. To enhance target video, use the echo stretch feature.
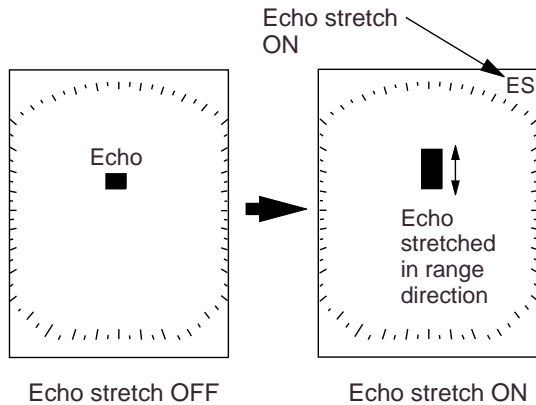


*Figure 1-21 Echo stretch*

1. Press the [MENU] key to open the menu.
2. Select ECHO STRETCH.
3. Select ON or OFF as appropriate.
4. Press the [MENU] key to register your selection and close the menu.

ES appears at the top right-hand corner on the screen when the echo stretch feature is on.

**Note 1:** Echo stretch magnifies not only small target pips but also returns from sea surface, rain and radar interference. For this reason, make sure that these types of inter- ference have been sufficiently suppressed before activating the echo stretch.

**Note 2:** Echo stretch is not available on the ranges between 0.125 and 0.75 nautical miles. The indication ES is highlighted on those ranges to show that echo stretch is inoperative.

## 1.24 Navigation Data

With navigation data input in NMEA 0183 format (IEC 61162-1), navigation data can be displayed at the screen bottom.

Navigation data includes position, course, speed, and range and bearing to destination waypoint (if set on navaid). A waypoint is shown on the remote display by a dashed ring connected to the screen center (own position) by a dashed line.
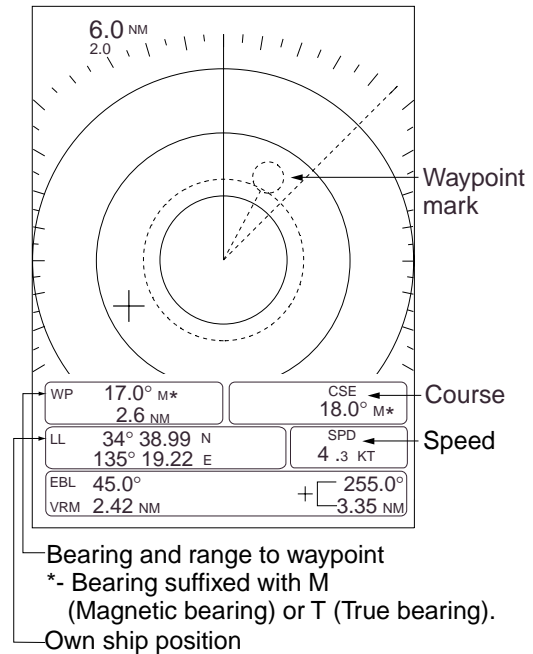


*Figure 1-22 Sample navigation data display*

**Note 1:** External sensor must be capable of outputting data to show it on the remote display.
**Note 2:** A location is blank when there is no corresponding data.
**Note 3:** To receive data from multiple equipment, all data must be combined into one data line by a data-mixing device.
**Note 4:** Magnetic and true bearings may be selected alternately by pressing and holding down the [GAIN] key.

### Turning on the navigation data display

1. Press the [MENU] key to open the menu.
2. Select NAV DATA.
3. Select ON.
4. Press the [MENU] key to finish.

## 1.25 Navigation Data During Standby

Navigation data may be displayed during standby (requires external sensors) as follows:

1. Press the [MENU] key to open the menu.
2. Select DSPL ON STBY.
3. Select NAV.
4. Press the [MENU] key to register your selection and close the menu.

```
WP
215.5°M
12.5NM

CSE          SPD
210.5°        12KT

LL        34°42.25' N
          135°24.12' E

TD        36378.1
          59096.4

        TEMP
        18.5°C

DEPTH
  1 2 5 M
```

*Figure 1-23 Sample navigation data screen shown during standby*

**Note 1:** Nav data can be accepted from two sources: navigator and video sounder. When two of the same type of device is outputting data to the remote display and the data is not identical, the two sets of data are displayed alternately.

**Note 2:** Magnetic and true bearings may be selected alternately by pressing and holding down the [GAIN] key.

### Unit of measurement for depth and water temperature

The unit of measurement for depth and water temperature (external sensors required) can be selected with the [EBL] key among Meters/Centigrade, Feet/Fahrenheit and Fathoms/Centigrade. The unit of depth measurement available depends on the data sentence output by external equipment as below.

DBT(Ver.1.5): Meters, feet and fathoms
DPT(Ver.2.0): Meters only

## 1.26 Echoes in Gray or White

The default setting displays echoes in tones of gray on a white background. However, you may reverse this arrangement as follows to suit lighting conditions.

1. Press the [MENU] key to open the menu.
2. Select VIDEO.
3. Select RVS.
4. Press the [MENU] key to register your selection and close the menu.

## 1.27 Selecting Ranges to Use

The radar has 14 ranges (Model 1712) or 13 ranges (Model 1622), some you may not require. You can select the ranges to use as follows. Ranges currently in use are highlighted.

1. Press the [MENU] key to open the menu.
2. Select RANGE.
3. Select range to use (or deselect) and press the [EBL] key.
4. Press the [MENU] key to register your selection and close the menu.

**Note 1:** At least two ranges are left on (highlighted).
**Note 2:** The active range is controlled by the equipment currently setting the range.

# 2. MAINTENANCE, TROUBLESHOOTING

## ⚠ WARNING

**Do not open the equipment.**

Hazardous voltage which can cause electrical shock exists inside the equipment. Only qualified personnel should work inside the equipment.

## 2.1 Maintenance

Regular maintenance is important for good performance. Table 2-1 tabulates items to be checked from time to time.

*Table 2-1 Maintenance items*

| Period | Item | Check point | Action |
|--------|------|-------------|--------|
| 3 months to 6 months | LCD | The LCD will, in time, accumulate a coating of dust which tends to dim the picture. | Wipe the LCD gently with a soft cloth. Do not use commercial cleaners to clean the LCD; they can remove paint and markings. |
| 6 months to 1 year | Connectors, cables, earth terminal | Check for tight connection and corrosion. Clean if necessary. | If any part is corroded, contact your dealer about replacement. |

## 2.2 Replacing the Fuse

The fuse (5A) in the power cable protects the equipment against reverse polarity of ship's mains and equipment fault. If the fuse blows, find the cause before replacing it.

## ⚠ CAUTION

**Use the proper fuse.**

Use of a fuse of the wrong amperage will damage the equipment and void the warranty.

## 2.3 Troubleshooting

Table 2-2 provides simple troubleshooting procedures which the user can follow to restore normal operation.

*Table 2-2 Troubleshooting*

| If… | But… | Then… |
|---|---|---|
| you pressed the [POWER] key to turn on the remote display (and the radar is turned on) | the control panel does not light and nothing appears on the display | <ul><li>check that the power cable is firmly fastened.</li><li>adjust DIMMER on the menu.</li><li>battery may have discharged.</li><li>check if fuse in power cable has blown.</li></ul> |
| | display contrast is poor | try adjusting LCD tone. |
| you turned on the power | "HD-SIG-MISS" and "BP-SIG-MISS" appear on the display | <ul><li>check to see if the radar is turned on and transmitting.</li><li>check that the signal cable between the radar and the remote display is tightly fastened.</li></ul> |
| a key is pressed | nothing happens | key may be faulty. Contact your dealer. |

## 2.4 Restoring Default Settings

All default menu settings can be restored by turning on the power while pressing and holding down the [MENU] key and ▼.

# 3. INSTALLATION

## 3.1 Display Unit Installation

### Mounting considerations

The display unit can be mounted on a desktop, the overhead, or flush mounted in a panel. See the next page for mounting dimensions.

When selecting a mounting location for the display unit keep in mind the following points.

- Locate the display unit in a position where you can view and operate it conveniently.
- The orientation of the display unit should be so that its screen is viewed while the operator is facing in the direction of the bow. This makes determination of your position much easier.
- The display unit is designed and constructed to be splashproof, thus it can be installed outdoors. If it is to be installed outdoors, we recommend installing it an enclosed cabinet, for maximum protection against the marine environment.
- Even though the picture is quite legible even in bright sunlight, keep the display unit out of direct sunlight or at least shaded because of heat that can build up inside the cabinet.
- The temperature and humidity of the mounting location should be stable and moderate. No LCD can provide adequate contrast if the ambient temperature is too low or too high.
- The compass safe distance of 0.90 meters (standard compass) and 0.60 meters (steering compass) should be observed to prevent deviation of the magnetic compass.

- Make sure you allow enough clearance both to get to the connectors behind the unit and to allow you to get your hands in on both sides to loosen or tighten the mounting knobs.
- Leave at least a foot or so of "service loop" in cables behind the unit for servicing or easy removal of the connectors.

### Removing the cover

While pressing the center of the cover with your thumbs as illustrated, pull the cover towards you to remove it.
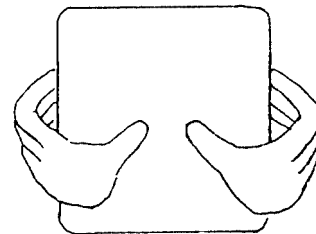


### Desktop, overhead mounting procedure

1. Fix the hanger to the mounting location with four tapping screws (supplied).
2. Attach the anti-vibration pads to the hanger as shown in the figure on the next page.
3. Fit the knob bolts to the display unit.
4. Cover the unused bolt holes with the dummy films (supplied).
5. Set the display unit to the hanger.
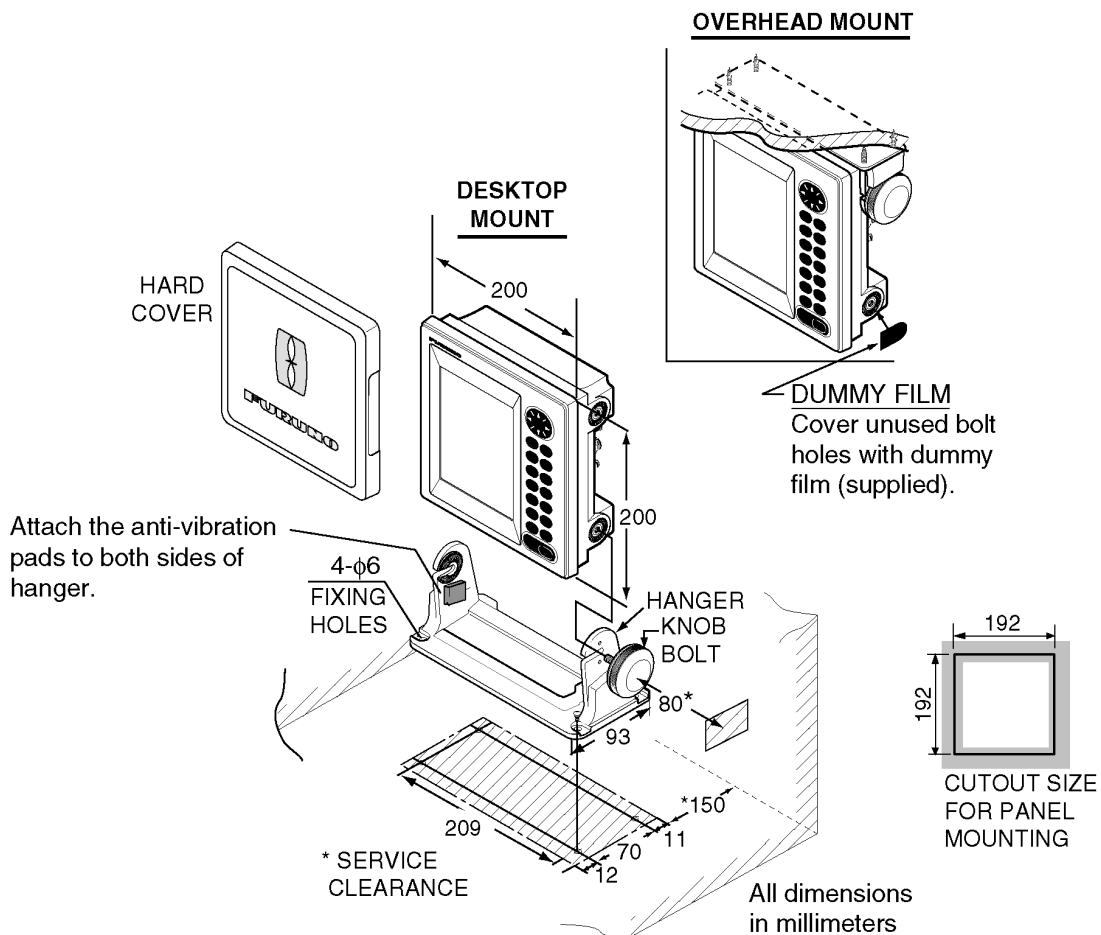6. Tighten the knob bolts securely.

*Figure 3-1 Mounting dimensions of display unit*

## 3.2 Wiring

### Connection of radar

1. Unfasten screws and three connector nuts (NMEA, POWER, DJ-1) from the rear cover of the radar to detach it.
2. Place the rear cover on a workbench, out side up.
3. Using a slotted-head screwdriver and hammer, punch out the "hole cover" from the location shown in Figure 3-2. Remove burrs from the hole with a fine file or sandpaper.
4. Insert MJ connector side of the MJ-XH connector (supplied) in the hole made at step 3 and fasten it with the connector nut (torque: 0.75-0.78 N•m). Tighten the connector nut by hand until you feel slight resistance and then turn it an additional 45° with a box wrench.

   **Note:** Be sure the MJ-XH connector is free of foreign material before attaching it. Watertight integrity cannot be guaranteed if foreign material (dust, etc.) is on the connector when it is assembled.

5. Plug in the XH connector of the MJ-XH connector into J7 on the DU Board.
6. Insert NMEA, POWER and DJ-1 connectors. Tighten connector nut by hand until you feel slight resistance and then turn it an additional 90° (NMEA and POWER) or 45° (DJ-1) with a box wrench.
7. Close the rear cover by using screws (3X12) in the installation materials. (Be sure the gasket is correctly positioned and there is no foreign material in the unit before closing the cover.)
8. Connect signal cable between connector DJ-1 on the remote display and the MJ connector (attached at step 4) on the radar.
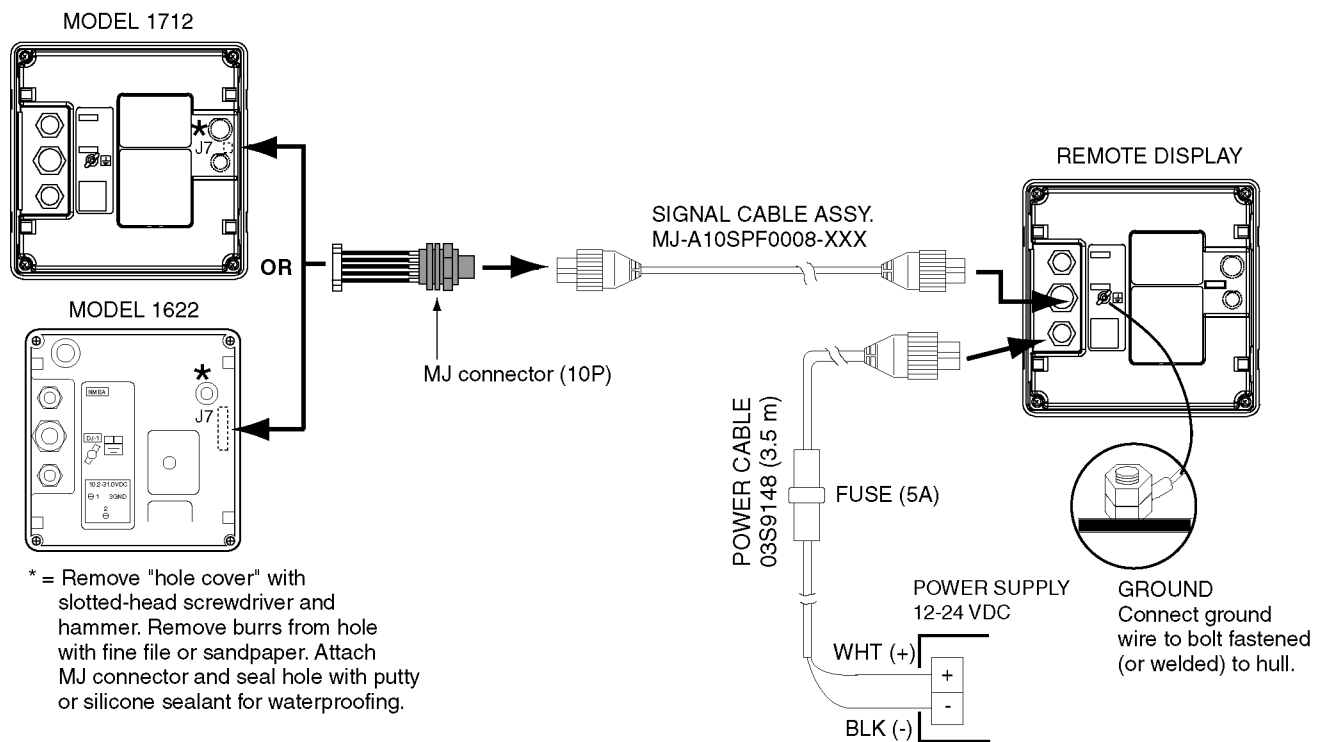9. Seal hole with silicone sealant or putty for waterproofing.

**16**

MODEL 1712

MODEL 1622

* = Remove "hole cover" with
slotted-head screwdriver and
hammer. Remove burrs from hole
with fine file or sandpaper. Attach
MJ connector and seal hole with putty
or silicone sealant for waterproofing.

OR

MJ connector (10P)

SIGNAL CABLE ASSY.
MJ-A10SPF0008-XXX

REMOTE DISPLAY

POWER CABLE
03S9148 (3.5 m)

FUSE (5A)

POWER SUPPLY
12-24 VDC

WHT (+)

BLK (-)

GROUND
Connect ground
wire to bolt fastened
(or welded) to hull.

*Figure 3-2 Wiring*

## Connection of navigator, echosounder

### Data sentences

The FMD-1712 can receive the following
NMEA 0183 format data sentences.

BWC: Bearing and distance to waypoint
BWR: Bearing and distance to waypoint,
     Rhumb line
DBK: Depth below keel
DBS: Depth below surface
DBT: Depth below transducer
DPT: Depth
GGA: Global positioning system fix data
GLC: Geographic position, Loran-C

GLL: Geographic position, Lat/Long
GTD: Geographic position, Time difference
HDG: Heading, deviation and variation
HDM: Heading, magnetic
HDT: Heading, true
MTW: Water temperature
RMA: Recommended minimum specific
     Loran-C data
RMB: Recommended minimum navigation
     information
RMC: Recommended minimum specific
     GPS/TRANSIT data
VTG: Course over ground and ground
     speed

### Connection

You will need an NMEA cable to connect a video sounder or a navigator. Connect it to the
NMEA connector at the rear of the remote display as shown below. When fastening the
power connector turn its knurled knob by hand until you feel slight resistance and then turn it
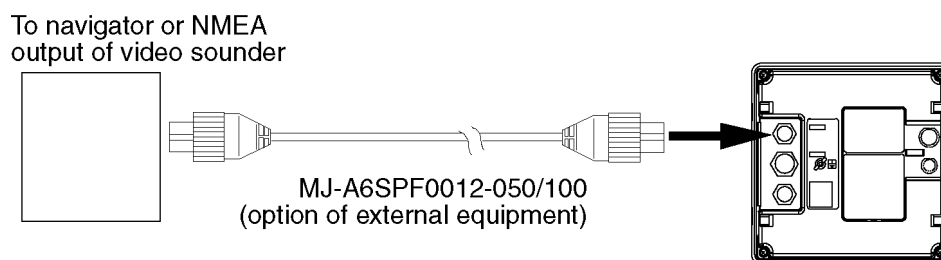an additional 90°.



To navigator or NMEA
output of video sounder

MJ-A6SPF0012-050/100
(option of external equipment)

*Figure 3-3 Navigator connection*

**17**

To connect a video sounder and a navigator, use NMEA cable MJ-A6SPF0003-050/MJ-A6SPF0009-100 (optional supply) and solder it as shown below.
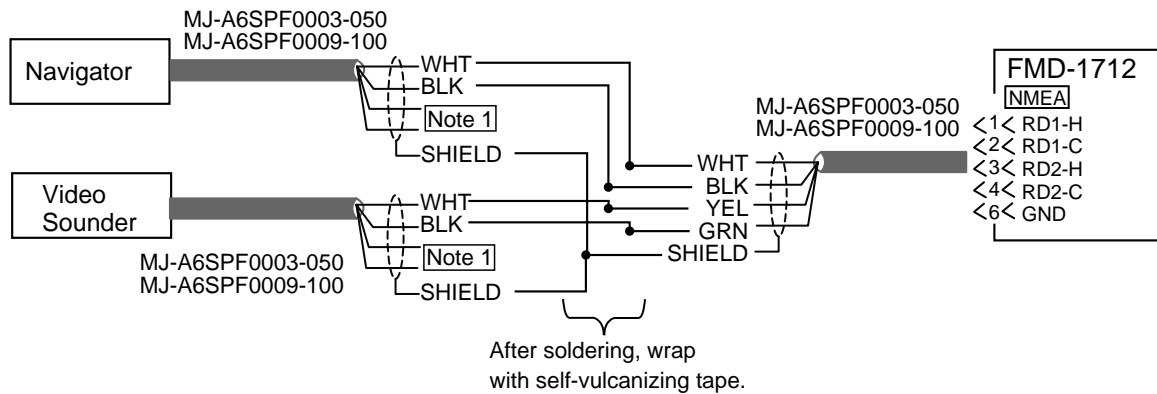


*Figure 3-4 Connection of video sounder and navigator cables*

**Note 1:** Tape unused wires to prevent short.
**Note 2:** Do not use a cross wiring-type NMEA cable which has connectors at both ends (for example, MJ-A6SPF0012-050). Miswiring can result if one of the connectors is removed to make the connection to the remote display.
**Note 3:** You may cut an NMEA cable which has a connector at both ends. However, do not modify a waterproof connector because watertight integrity cannot be guaranteed.
**Note 4:** Data is alternately displayed when two of the same type of data is input.

To connect a navigator or echosounder whose NMEA output uses other than a FURUNO 6 pin NMEA connector, use NMEA cable type MJ-A6SPF0003-050/MJ-A6SPF0009-100 to make the connection.



*Figure 3-5 Connection of video sounder and navigator cables using NMEA cable type MJ-A6SPF0003-050/MJ-A6SPF0009-100*
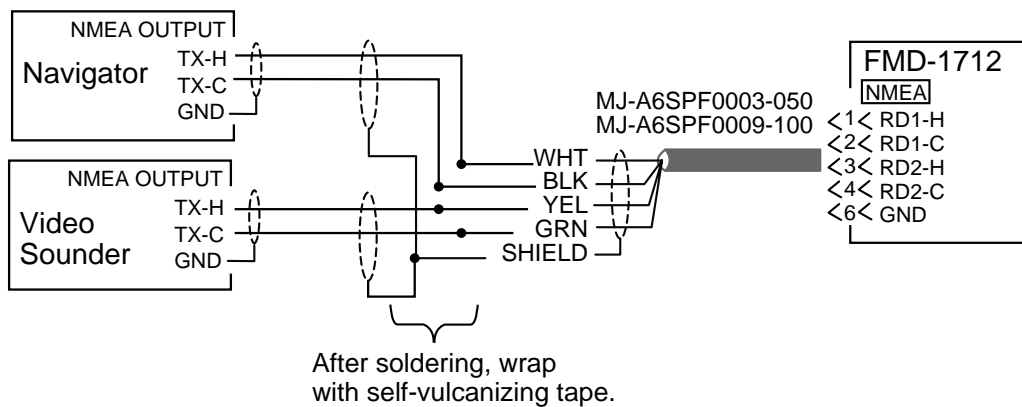
**18**

## Connection of external buzzer (option)

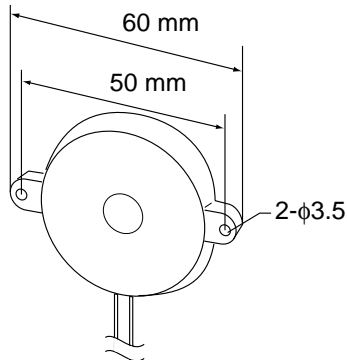The external buzzer provides an aural alarm when the guard zone is violated.



*Figure 3-6 External buzzer*

### External buzzer installation kit contents

Type: OP03-168, Code No.: 008-462-790

| Name | Type | Code no. | Qty |
|---|---|---|---|
| MJ-XH conn. | 03-2022 (2-3P) | 008-463-540 | 1 |
| Buzzer assy. | 80-0641 | 008-462-800 | 1 |

### Procedure

1. Unfasten screws and three connector nuts (NMEA, POWER, DJ-1) from the rear cover to detach it.
2. Place the rear cover on a workbench, out side up.
3. Using a slotted-head screwdriver and hammer, punch out the "hole cover" from the location shown in the figure below. Remove burrs from the hole with a fine file or sandpaper.

Remove hole cover with slotted-head screwdriver and hammer. Remove burrs from hole with fine file or sandpaper.



J6 located at right side of shield case under the rear panel.
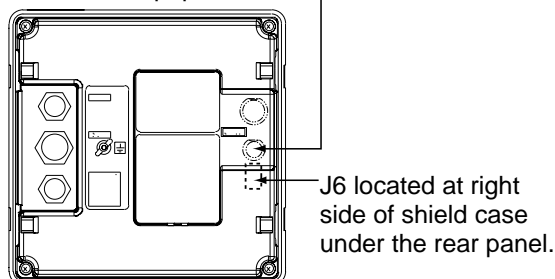
*Figure 3-7 Display unit, rear view*

4. Set the gasket to the MJ connector and insert the connector in the hole made at step 3.

5. Fasten the connector with the connector nut (torque: 0.75-0.78 N•m). Tighten the connector nut by hand until you feel slight resistance and then turn it an additional 45° with a box wrench.
6. Plug in the XH connector at the end of the MJ connector into J6 on the DU Board. (See Figure 3-7 for location.)
7. Insert NMEA, POWER and DJ-1 connectors. Tighten connector nut by hand until you feel slight resistance and then turn it an additional 90° (NMEA and POWER) or 45° (DJ-1) with a box wrench.
8. Reattach the cover. (Be sure the gasket is correctly positioned and there is no foreign material in the unit before closing the cover.)
9. Fasten the buzzer within 1 m of the display unit with two tapping screws (3X15 or 3X20, local supply).
10. Attach the connector from the external buzzer to the MJ connector.



*Figure 3-8 How to assemble MJ-XH connector assembly*

**Note:** Assemble the MJ-XH connector assembly exactly as shown in Figure 3-8, otherwise watertight integrity cannot be guaranteed. Further, watertight integrity cannot be guaranteed if foreign material (dust, etc.) is on the connector when it is assembled.

**19**

## 3.3 Selecting Radar Display, Remote Display Function

This section shows you how to select the radar connected to the FMD-1712 and remote display function.
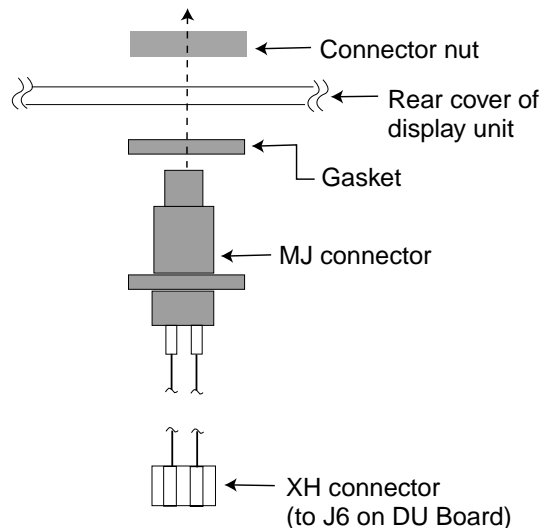
1. Press the [TX] key to set the equipment in the stand-by mode.
2. Press and hold down ▲ and ▼ together (about 10 seconds) to display the maintenance menu.

| PROGRAM NO 03591690XX* | SEL MENU BY ◄/► KEY |
|---|---|
| 1 MODEL **1712** 1622 | |
| **2** DISPLAY **NORM** DEMO | |
| NAV DATA (NMEA 0183) GLL BWR BWC GLC GTD RMA RMB RMC VTG MTW DBT DBS DPT GGA | |

\* XX = Program Version No.

*Figure 3-9 Maintenance menu*

3. Select 1 MODEL followed by 1712 or 1622 as appropriate.
4. Select 2 DISPLAY followed by NORM or DEMO (shows internally generated radar echoes on the FMD-1712) as appropriate.
5. Press the [MENU] key to close the menu.

## 3.4 Adjustments

Do the following in the order shown to adjust the remote display.

### 1) Adjustment of picture

1. Press the [POWER] key on the display unit.
2. Adjust the gain referring to paragraph 1.8 on page 4.
3. Adjust the STC referring to paragraph 1.9 on page 4.

### 2) Heading alignment

A small but conspicuous target dead ahead visually should appear on the heading line (zero degrees). In practice, you will probably observe some small error on the display. The following adjustment will compensate for this error, up to ±30°.

1. Identify a suitable target (for example, ship or buoy) at a range between 0.125 to 0.25 miles, preferably near the heading line. To minimize error, keep echoes in the outer half of the picture by changing the range.
2. Press and hold down ◄ and ► together (about 10 seconds) to display the installation menu.

Total hours remote display has been turned on

Menu

| SEL MENU BY ▼/▲ KEY | TOTAL ON TIME 00000 : 00 |
|---|---|
| **1** ADJ HDG 2 ADJ TMG 3 **NM** /KM | |
| ADJUST PICTURE ORIENTATION USING ◄/► KEYS SO THAT HEADING MARK BISECTS TARGET LOCATED DEAD AHEAD. | |

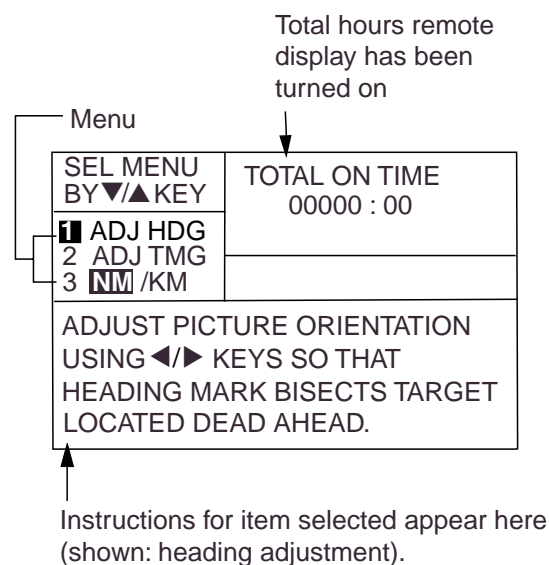Instructions for item selected appear here (shown: heading adjustment).

*Figure 3-10 Installation menu*

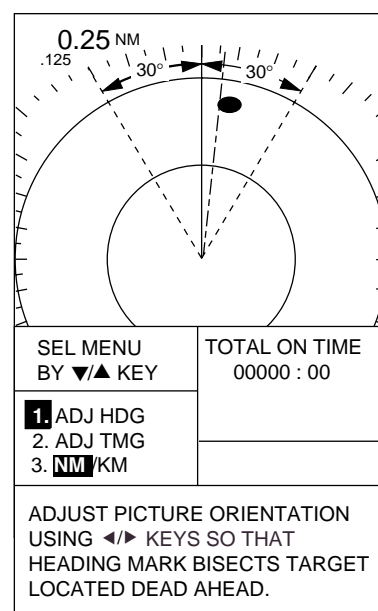3. Select ADJ HDG. Your display should now look something like the one shown in Figure 3-11.



*Figure 3-11 Display for adjustment of heading*

4. Press ◀ or ▶ to bisect the target selected at step 1 with the dot-dash line and press the [MENU] key. Then, the target shifts to 0° as below.
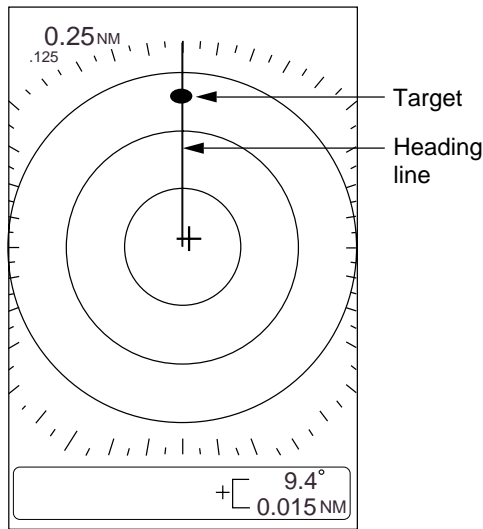


*Figure 3-12 Bisecting target*

5. As a final test, move the boat towards a small buoy and confirm that the buoy shows up dead ahead on the display when it is visually dead ahead.

**3) Sweep timing**

Sweep timing depends on the length of the signal cable between the radar and the antenna. Adjust it so that a straight target is not pushed or pulled as in the examples below.



Correct    Target pushed inward    Target pushed outward
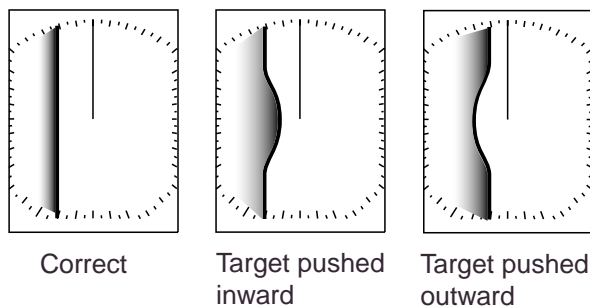
*Figure 3-13 Examples of improper and correct sweep timings*

1. Transmit on 0.125 or 0.25 nm range and adjust the sensitivity and STC.
2. Visually select a straight echo (harbor wall, straight pier).
3. Press and hold down ◀ and ▶ together (about 10 second) to display the installation menu.
4. Select ADJ TMG from the installation menu.

5. While looking at the target selected at step 2, straighten it by pressing ▶ if it is pulled inward, or ◀ if it is pushed outward.

**4) Unit of range measurement for VRM and cursor**

The unit of range measurement for the VRM and the cursor may be selected to nautical miles or kilometers as follows:

1. Select NM/KM from the installation menu.
2. Select unit of range desired.
3. Press the [MENU] key to close the menu.
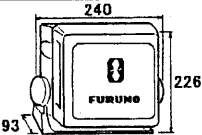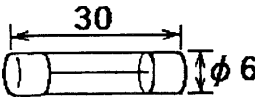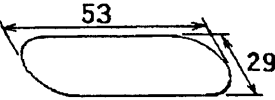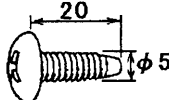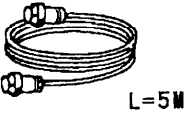
# 3.5 Confirming Data Sentences

You can confirm which NMEA data sentences are being output from a navigator and/or echosounder to the remote display. Follow step 1 in paragraph 3.4 to display the maintenance menu. NMEA data sentences being output to the remote display are highlighted at the bottom of the menu. (Be sure to power navigator and/or echosounder to confirm sentences.)

# SPECIFICATIONS OF THE RADAR REMOTE DISPLAY
# FMD-1712

## 1. GENERAL

(1)  Picture Tube             7 inch rectangular monochrome LCD

240(H) x 320(V) dots, Effective radar display area: 240 x 240 dots

(2)  Brightness              80 cd min

(3)  Scanning method         Luster scan

(4)  Range, Range Ring Interval, Number of Rings

| Range (NM) | 0.125 | 0.25 | 0.5 | 0.75 | 1 | 1.5 | 2 | 3 | 4 | 6 | 8 | 12 | 16 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring Interval (NM) | 0.0625 | 0.125 | 0.125 | 0.25 | 0.25 | 0.5 | 0.5 | 1 | 1 | 2 | 2 | 3 | 4 | 6 |
| Number of Rings | 2 | 2 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 4 | 4 | 4 | 4 |

(4)  Input data              Heading data, Bearing data, Trigger signal and Video signal

## 2. POWER SUPPLY

(1) Main Unit                12-24 VDC: 0.6-0.3 A

## 3. ENVIRONMENTAL CONDITION

(1) Ambient Temperature      -15°C to +55°C

(2) Relative Humidity        95% at 40°C

(3) Water proofing           IPX-5

(4) Vibration                IEC60945

## 4. COATING COLOR

(1) Main Unit                Panel: N3.0, Chassis: 2.5GY5/1.5

# PACKING LIST

## FMD-1712

| NAME | OUTLINE | DESCRIPTION/CODE No. | Q'TY |
|---|---|---|---|
| ユニット　　　　UNIT | | | |
| 副指示部<br>SUB-DISPLAY UNIT | 240 / 226 / 93 | RDP-137<br>000-087-760 | 1 |
| 予備品　　　SPARE PARTS | | SP03-09800 | |
| ヒューズ<br>FUSE | 30　φ6 | FGB0-A 5A AC125V<br>000-549-064 | 2 |
| 工事材料　　INSTALLATION MATERIALS | | CP03-21101 | |
| ブラインドフィルム(K)<br>DUMMY FILM(K) | 53　29 | 03-118-1103-0<br>100-185-380 | 1 |
| +トラスタッピンネジ<br>+TAPPING SCREW | 20　φ5 | 5X20 SUS304 1シュ<br>000-802-081 | 4 |
| MJ-XHコネクタ<br>CONNECTOR ASSY. | φ26 | 03-2023(10-10P)<br>008-506-980 | 1 |
| その他工材　　OTHER INSTALLATION MATERIALS | | | |
| ケーブル組品 5A<br>CABLE ASSY. | L=3.5M | MJ-A3SPF0013-035<br>000-129-613 | 1 |
| ケーブル組品<br>CABLE ASSY. | L=5M | MJ-A10SPF0008-050[5M]<br>000-143-494 ** | 1<br>(*1) |

注記)　1.(*1)印の信号ケーブル組品は、5m,10m,20m,30mの長さがあります。
　　　　5,10,20,30m CABLE IS SELECTIVE ON DEMAND.
　　　2.コード末尾に[**]の付いたユニットは代表の型式/コードを表示しています。
　　　　CODE NUMBER ENDED BY "**" INDICATES THE NUMBER OF TYPICAL MATERIAL.

DWG NO.
C3493-Z02- B

（略図の寸法は、参考値です。　DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

# FURUNO ELECTRIC CO., LTD.

表 1 TABLE 1

| 寸法区分 (mm) DIMENSION | 公差 (mm) TOLERANCE |
|---|---|
| 0 < L ≦ 50 | ± 1. 5 |
| 50 < L ≦ 100 | ± 2. 5 |
| 100 < L ≦ 500 | ± 3 |
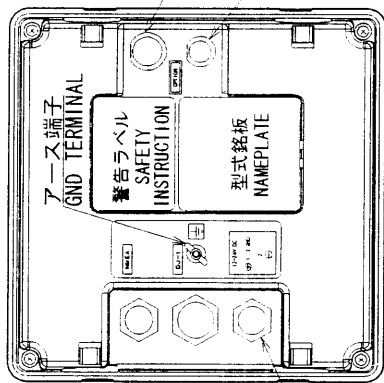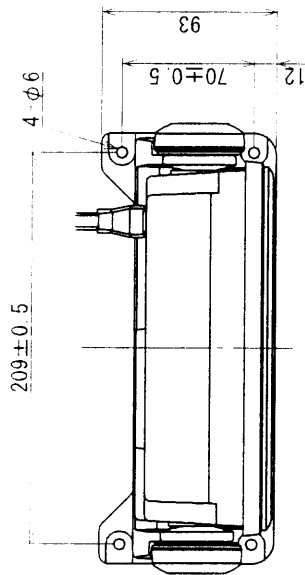
オプション (副指示器出力) 用
OPTION (FOR SLAVE DISPLAY)

オプション (外付けブザー) 用
OPTION (FOR EXT. BUZZER)

矢視 A VIEW A

アース端子
GND TERMINAL

警告ラベル
SAFETY INSTRUCTION

型式銘板
NAMEPLATE

電源
SOURCE

#150

72

16

12

30°

229

#150

93

70±0.5

12

4-φ6

209±0.5

#80

#80

226

200

240

200
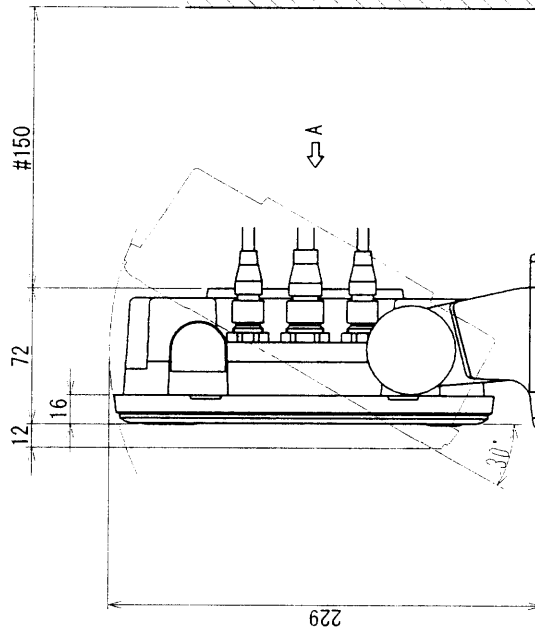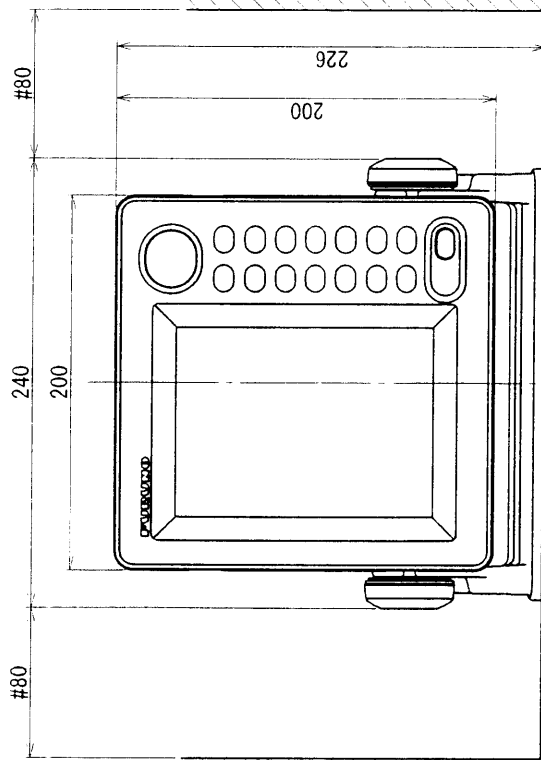
注記
1) #印寸法は最小サービス空間寸法とする。
2) 指定外の寸法公差は表1による。
3) 取付用ネジはトラスタッピンネジ呼び径5x20を使用のこと。
4) 装備ケーブルはサービス時、本体を前方に二十分引出せるよう余裕を持たせること。

NOTE
1. #: RECOMMENDED SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
3. USE TAPPING SCREWS 5x20 FOR FIXING UNIT.
4. KEEP ENOUGH CABLE LENGTH BEHIND UNIT.

| DRAWN | July 21 '01 T.AMASAK |
|---|---|
| CHECKED | July 21 '01 |
| APPROVED | |
| SCALE 1/4 | MASS 1.6 kg ±10% |
| DWG. No. C3489-G01- B | 03-152-1000-G2 |

| TITLE | RDP-134/137 |
|---|---|
| 名称 | 指示部 (卓上装備) 外寸図 |
| NAME | DISPLAY UNIT (DESKTOP MOUNT) OUTLINE DRAWING |

FMD-1712
MODEL 1712

FURUNO

4

3

2

1

A

B

C

指示器
DISPLAY UNIT
RDP-134 (MODEL 1712)
RDP-125 (MODEL 1622)

J1354  *3

1 < NC
2 < NC
3 < TRIGGER
4 < BP-HD
5 < GND
6 < VIDEO
7 < GND
8 < COM-H
9 < COM-C
10 < GND

MJ-A10SPFA  *1

MJ-A10SPF0008, 5/10/20/30m
(10C+2C-2V, φ10, 30m MAX.)

BRN  チャ
BLU  アオ
RED  アカ
BLK  クロ
ORG  ダイ
YEL  キ
GRN  ミドリ
CO-AX 2C-2V  ドウジク
GRY  ハイ
WHT  シロ

MJ-A10SPFA  *1

レーダー副指示器
RADAR REMOTE DISPLAY
RDP-137

DJ-1

1 > NC
2 > NC
3 > TRIGGER
4 > BP-HD
5 > VIDEO
6 > GND
7 > GND
8 > COM-H
9 > COM-C
10 > GND

12/24V DC

J1351

1 < SHIP'S MAINS (+)
2 < SHIP'S MAINS (-)
3 < GND

MJ-A3SPF  *1

シロ WHT
クロ BLK

NMEA
J1352

1 < RD1-H
2 < RD1-C
3 < RD2-H
4 < RD2-C
5 < NC
6 < GND

MJ-A6SPF  *1

*3
MJA6SPF0003, 5m, φ6.5
MJA6SPF0009, 10m, φ6.5

シロ WHT
クロ BLK
キ YEL
ミドリ GRN

EXT. BUZZER
J1353  *3

1 < +12V
2 < EXT. BUZZER

MJ-A2SPF  *3

外付ブザー
EXT. BUZZER
OP03-168  *3

1m

GND  *2
IV-1.25SQ

船内電源
SHIP'S MAINS
12/24 VDC

100/110/115/
220/230 VAC,
1φ, 50/60Hz

03S9148-1, 3.5m, φ7    5A

5 6 1 2

整流器
RECTIFIER
PR-62

航法装置
NAVAID

TX-H  *4
TX-C
GND

魚探
E/S EQUIP.

TX-H
TX-C
GND

注記
* 1) 工場にて取付済み。
* 2) 造船所手配。
* 3) オプション。
* 4) 航法データは2系統接続可能。(ケーブル加工必要)

NOTE
*1. FITTED AT FACTORY.
*2. SHIPYARD SUPPLY.
*3. OPTION.
*4. 2WAY DATA INPUT AVAILABLE. (CABLE MODIFICATION NEEDED)

| TITLE | FMD-1712 |
|---|---|
| 名称 | レーダー副指示器 |
| | 相互結線図 |
| NAME | RADAR REMOTE DISPLAY |
| | INTERCONNECTION DIAGRAM |

| DRAWN | Jan.23 '01 T. YAMASAKI |
| CHECKED | Jan.23 '01 |
| APPROVED | |
| SCALE | MASS | kg |
| DWG. No. | C3493-C01- C | 03-152-6011-2 |

FURUNO ELECTRIC CO., LTD.

U1 DISPLAY UNIT
RDP-137

A

B1  DU
03P9295B

J1351

SHIP S MAINS
12/24V DC
< 1 ← SHIP'S MAINS+
< 2 ← SHIP'S MAINS-
< 3 ← GND

W1
J1
+12V_PTU → 1
VCC_PTU → 2
-6V_PTU → 3
-24V_PTU → 4
GND → 5
GND → 6
+12V → 7
VCC → 8
-6V → 9
-24V → 10

B3 DISPLAY

J3 | (P3)
LCD_D0 → 1 > ① D0
LCD_D1 → 2 > ② D1
LCD_D2 → 3 > ③ D2
LCD_D3 → 4 > ④ D3
LCD_OFF → 5 > ⑤ D_OFF
FLAME → 6 > ⑥ FLAME
DF → 7 > ⑦ DF
LOAD → 8 > ⑧ LOAD
CP → 9 > ⑨ CP
VCC → 10 > ⑩ VDD
GND → 11 > ⑪ VSS
-24V → 12 > ⑫ VEE
VO → 13 > ⑬ VO
GND → 14 > ⑭ FG

DJ1

MAIN RADAR
< 1 ← S.M.HOT
< 2 ← S.M.COLD
< 3 ← TRIGGER
< 4 ← BP_HD
< 5 ← GND
< 6 ← VIDEO
< 7 ← GND
< 8 ← COM.HOT
< 9 ← COM.COLD
< 10 ← GND

B

J2 | (P2)
CFL-HV → 1 > ① CFL_HOT
NC → 2 > ② CFL_GND
NC → 3 >
GND → 4 >

J1352

NMEA0183
< 1 ← RD1-H
< 2 ← RD1-C
< 3 ← RD2-H
< 4 ← RD2-C
< 5 ← NC
< 6 ← GND

B2  PNL
03P9294

J4 | J4
ANG → 1 > ANG
+5V → 2 > +5V
AN1 → 3 > AN1
GND → 4 > GND
AN2 → 5 > AN2
+12V → 6 > +12V
AN3 → 7 > AN3
GND → 8 > GND
AN4 → 9 > AN4
GND → 10 > GND
AN5 → 11 > AN5
GND → 12 > GND
DIM → 13 > DIM
GND → 14 > GND
BUZ → 15 > BUZ
DC+ → 16 > DC+
GND → 17 > GND
PWR → 18 > PWR
GND → 19 > GND
DC- → 20 > DC-

C

EXT.BUZZER
(OPTION)
J1353          P6 | J6
< 1 ←——————— < 1 ← +12V
< 2 ← NC
< 2 ←——————— < 3 ← EXT.BUZZER

(NOTE1)

D

(NOTE1) CONNECTOR ASSY SUPPLIED WITH OP03-168.

| DRAWN July 21 '00 T.YAMASAKI | | | TYPE RDP-137 |
| CHECKED July 21 '00 Y.K | | | 名称 レーダー副指示器 |
| APPROVED July 21 '00 Y.K | FMD-1712 | | 回路図 |
| SCALE / | MASS kg | APPLICABLE TO; (MODEL) | BLOCK NO. | NAME RADAR REMOTE DISPLAY |
| DWG NO. C3493-K01- B | | 03-152-6012- 1 | | SCHEMATIC DIAGRAM |

FURUNO ELECTRIC CO., LTD.

# INDEX